university of toronto
computing services

Computer News

FEL-0304.(01)

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ISSN 0315-4661 October/November 1982 No. 202

Publisher

University of Toronto
Computing Services
Toronto, Ontario
Canada M5S 1A1

Editor: William Fehlner

Production Editor: Kathryn Bourne

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Subscriptions

Subscription changes should be entered on the tear-out form at the back of this issue, and mailed to the Information Office, Engineering Annex, Room 206 (or phone 416-978-4990).

COMPUTERNEWS is published 8 times yearly by University of Toronto Computing Services. Enquiries or contributions should be directed to:

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University of Toronto
Toronto, Ontario
Canada M5S 1A1

Permission is granted to reprint articles from *COMPUTERNEWS* for noncommercial purposes provided the author, publication and issue are acknowledged.

BICS

BICS (Basic Instructional Computing System) is the newest system offered by UTCS. It is a basic UNIX system running under VM/370 on an IBM 3033. The service allows students to enter, edit, save, and delete datasets on a terminal which has the characteristics of an IBM 3277. A standard UNIX editor, with several enhancements added at the University of Toronto, is available for text editing. Jobs are submitted to the High Speed Job Stream and output is printed at the local BICS site.

A primary component of the BICS software is the Amdahl Universal Time-Sharing System (UTS). This is a conversion and extension of Version 7 of Bell Laboratories UNIX Time-Sharing System which allows operation on Amdahl or IBM compatible processors. UTS is designed to operate in a virtual machine environment as provided by VM/370. Since UTS is aware of its environment, it takes advantage of many of VM/370's facilities. At the same time, it maintains the commands and flexible file system of Version 7 of UNIX.

Four BICS virtual machines currently run on an IBM 3033/U16 processor under VM/370. As part of a partnership agreement with the University of Toronto, IBM provided the 3033 and associated hardware. The computer was delivered in July and installation was completed in early August. Prior to hardware installation, software, such as VM/370 and the UTS version of UNIX, was tested on the IBM 3033/N12 system.

Site preparation proceeded in parallel with the installation and testing of hardware and software. The number of terminals at the Robarts site has been increased to 68. ASUT, the undergraduate facility in the Sidney Smith Building, has been completely converted from keypunches to 50 BICS terminals. Another site at Victoria College (with 22 terminals) is scheduled to open some time in November, 1982.

Due to the size of the BICS project, and the short time frame for installation, a number of hardware and software problems have occured. Nonetheless, both the Robarts and Sidney Smith sites were able to open in mid-September. Further hardware problems, especially with the Series/1 minicomputer used for terminal communications, have continued to occur. These problems are an inevitable experience with such a new system, but UTCS and IBM are continuing to work to minimize these growing pains.

Taking the BICS system from a concept to an effective student service has been a cooperative effort. User documentation for BICS is provided by the Department of Computer Science. Primary student support comes through course instructors and tutors. UTCS Student Advisors are available weekdays in the Sidney Smith Building to help with syntax problems related to the HSJS processors. The primary responsibility of UTCS is to solve system problems encountered in the BICS environment. In this initial phase, the BICS system is being continuously monitored and tuned by UTCS staff.

Bob Keith

UTCS Short Courses (Non-Credit)

UTCS offers a number of short, non-credit courses on the use of various products and services that we support. They usually last from five to ten hours and, depending on the course, may be for one full day or spread out over several days.

The courses are available to students, faculty, and staff of the University of Toronto, and to other users as well. Those interested in taking these courses should contact

Education Facility Co-ordinator
Room 217, McLennan Physics
978-4565

for the date and time of the next session or to be placed on a waiting list. Once a course is scheduled, registrants must pay a $10.00 registration fee, payable in cash or non-computing appropriation, one week before the first meeting. They are also required to hold a valid Service Access Code (SAC) for use during the course.

Several courses were described in detail in the September issue of *COMPUTERNEWS*. These are listed below by title and course length. A new course on IBM disk data sets has been added and is described in detail. Note that courses are normally held in the UTCS Education Facility, Room 221, McLennan Physics.

DDS101 - Introduction to IBM Disk Data Sets

This course is intended for people who are switching from cards to interactive computing or for people who would like to use disk files on the IBM system. It is especially recommended for people who are planning to take the WYLBUR short course.

This course will present the basic concepts required to work with disk data sets on an IBM system. The course includes an overview of steps required to create and maintain data sets. Some examples of the application of data sets in WYLBUR, SAS, and SPSS will be given.

Time: one day, two hours total

DB101 - Introduction to Data Base Concepts

Time: two days, 2.5 hours per day
Instructor: Paul Roth, 978-8701

DEC101 - DECsystem-10 Novice Users

Time: one day, five hours total
Instructor: Corot Reason, 978-6601

DEC201 - DECsystem-10 Assembler

Time: five days, 1.5 hours per day
Instructor: Dr. Edmund West, 978-4085

DEC301 - DECsystem-10 Advanced Users

Time: one day, five hours total
Instructor: Corot Reason, 978-6601

JCL101 - JCL for Beginners

Time: five days, one hour per day
Instructor: Rob Janes, 978-2670
Steve Younker, 978-6346

SAS101 - Introduction to SAS

Time: five days, one hour per day
Instructor: Diane Mitchell, 978-5128

SAS201 - Intermediate SAS

Time: five days, one hour per day
Instructor: Diane Mitchell, 978-5128

SAS/GRAPH101 - Introduction to SAS/GRAPH

Time: three days, one hour per day
Instructor: Diane Mitchell, 978-5128
Steve Younker, 978-6346

continued...

Short Courses continued

TXT103 - Text Processing on UNIX for Beginners

Time: five days, three hours per day
Instructor: Dawne Smith, 978-4548

TXT203 - Introduction to TBL

Time: two days, three hours per day
Instructor: Dawne Smith, 978-4548

WYL101 - Introduction to WYLBUR

Time: five days, one hour per day
Instructor: Rob Janes, 978-2670
Steve Younker, 978-6346

William Fehlner

Special Forms

With the increasing amount of computer usage, and the increasing costs of paper, UTCS has been obliged to implement a budget commitment to recover the costs of paper in real money.

A letter has gone to all users advising them that, effective November 1st, charges incurred by users for special forms printed at UTCS sites will be levied in real money funds. Users must charge the $3.25 mount charge and the paper usage charge (a new charge) to a real money appropriation. These charges will appear on the monthly CAN report as a special item identifying them as special forms charges. The charge for paper consumption will vary according to the nature of the form used, and is intended to identify costs to UTCS of the forms being printed. The mount charge is intended to reflect the cost to UTCS of changing the forms on the printer. Other charges for printing will remain as before and may be charged against any source of funds.

Other consumable output, e.g. punched output and plot output, will also be charged against real money appropriations. The Xerox 9700 service falls into this category, but the mount charge in this case will be $5.00.

Dr. Frank Spitzer

New Terminal Rental and Communication Policies

Effective immediately UTCS is reducing the rental rates for some **video** interactive asynchronous terminals. The new rates are as follows:

Volker Craig (VC303)
DEC (VT50, VT52)
Soroc (IQ-120)
@ $600/year, $50/month

Volker Craig (VC404)
Cybernex(APL-100)
DEC (VT-100)
Lanpar (XT-100)
Datamedia (Elite 1520)
@ $960/year, $80/month

The rates for **hardcopy** interactive asynchronous terminals remain unchanged. They are:

DEC (Decwriter II, LA36)
@ $1250/year, $105/month

Xerox (Diablo 1620, 1641)
CDI (1030, 1050)
@ $1500/year, $125/month

Xerox forms tractor attachment
@$120/year, $10/month

The rental of any particular terminal is sub-

continued...

Terminal Rental continued

ject to availability. The rates include the terminal and an acoustic coupler or Gandalf limited distance modem. A manufacturer's manual may also be provided on request, subject to availability. Hardcopy terminals are equipped with useable ribbon and print element appropriate for the user's purpose. For the CDI terminals, a roll of thermal paper will be supplied. Additional ribbons, print elements, and thermal paper can be purchased at the UTCS Information Office, Room 206, Engineering Annex.

Communications Arrangements

The user has several options when choosing a communications mode. The cheapest is an acoustic coupler which operates at 300 baud (30 characters/second) over standard phone lines. UTCS supplies the coupler and an EIA cable to connect the coupler to the terminal. All hardcopy terminals in the UTCS rental pool operate at 300 baud only.

Users can access UTCS computers at higher baud rates if the have the appropriate equipment. Several vendors, including Bell Canada, rent or sell 1200 baud modems (120 characters/second) which operate over standard phone lines. UTCS will be happy to assist users in recommending the most appropriate equipment to select.

Users who are on campus or relatively nearby (say within 5 kilometers) can access UTCS systems at rates up to 4800 baud. The following additional charges are involved:

- A one time installation charge of $40 for a pair of Gandalf LDS (limited distance) modems.
- A $10/month charge for a UTCS Data Channel to connect the terminal directly to the PACX (a terminal-computer telephone exchange).
- Cabling required to connect the terminal to the PACX. This depends on the exact location of the equipment. Users contemplating this option should contact UTCS for estimates.
- Users have the option of letting Bell Canada install the Data Channel between the terminal and the UTCS PACX. In this instance, the user is billed directly by Bell for the installation and monthly service. The user must still pay the $40 installation charge for the Gandalf modems. UTCS staff will be happy to assist users in making arrangements with Bell for the Data Channel.

Because of the length of time (up to six weeks) and cost involved in setting up a Data Channel, users contemplating short term rental of only a few months should not consider this option.

Note that these same communication options are available to users who own their own terminal. In this case, however, the user must pay the the cost of the necessary modems.

Billing and Terms

Rentals are subject to the following conditions:

- Users will normally be billed for terminals on a quarterly basis, at the end of each quarter of the university fiscal year: July 31, October 31, January 31 and April 30 (to be issued on March 15). If the rental period ends before the quarterly period, the billing will occur at the end of the rental period.
- The minimum rental period is one month. Users must give 30 days written notice of termination.
- The user is liable for all loss or damage to equipment at replacement cost.
- All rates on equipment and services are subject to an annual review, with a 90 day written notice of rate changes.

Additional Charges

UTCS will bill the user for costs incurred with respect to pickup and delivery at cartage company rates. Alternatively, users may arrange transportation of terminals and equipment themselves. Provincial sales tax will be applied to users who do not qualify for exemption.

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Terminal Rental continued

Communications

UTCS Data Channels are billed annually at the beginning of each university fiscal year.

Installation and monthly service of Bell Data Channels will be billed by Bell directly to the user.

Funding and Payment

University users must supply a 'real-fund' appropriation account number (i.e., NOT 1-xxx-xxx-90, 95 or 98). External users may pay cash in advance of the billing period or be invoiced. Invoices are payable within 30 days of issue.

Who to Contact

The Education Facilities Co-ordinator (Irene Rosiecki, 978-4565, McLennan Labs, Room 217) will supply details concerning the availability of terminals, rates, and installation arrangements, and will also provide advice on the suitability of one model over another. On request, the Co-ordinator will also arrange a demonstration of the type of terminal selected, look after terminal setup, and provide instructions on terminal connection to communication lines at the user's site.

The Business Office is responsible for preparing the necessary paperwork for a rental contract and arranging for terminal delivery. Please contact Marg Doherty, 978-3960, McLennan Labs, Room 337.

Ihor Prociuk

New MARK IV Release Coming

UTCS will shortly be installing a new release of MARK IV. This new version, Release 9, is expected to have little impact upon the UTCS MARK IV user community. There are some minor changes, however, in the freeform reporting capability (now referred to as "Formatted Reporting" or "Formatted Sectional Reporting").

For more information about the timing of the installation of Release 9 of MARK IV, please watch HOTNEWS.

John Bradley

IPRINT Enhancements

On October 18, a new version of IPRINT, which had been tested for several weeks, was put into production. The enhancements included in this maintenance release include support for the full EBCDIC character set. A new technique allows subscripts and other special print characters on the 5000 series (ALA/TN) print train to be used when accessed through IPRINT. Users simply specify the desired special character by means of the Control-X translation feature. See HELP IPRINT and DOC:IPRINT.DOC for details of this feature.

In addition IPRINT has been enhanced to correctly print files with overstrikes (that is, character /backspace /overstrike-character). Provision has been made to print lines with as many as 5 overstrikes in the same position by using backspaces. This should be sufficient to handle various combinations of accents, underlining, and boldface type.

Lidio Presutti

ORACLE: Online Help for PL/C and WATFIV Users

ORACLE is a program, developed by UTCS staff, which is designed to give online advice about error messages generated from PL/C or WATFIV.

By entering the error message number for PL/C, or the first word of a WATFIV error message, ORACLE will display advice about the selected error message, including:

- the full text of the error message
- a more detailed explanation of what the error is
- a list of actions to take to detect what's causing the error
- examples of source code which could cause the error
- advice on how to correct the error

The program is easy to use, and will be available 24 hours a day. One dedicated full-screen terminal (an XT-100) will run ORACLE at each of the following sites:

- Robarts BICS Facility
- Sidney Smith BICS Facility
- Engineering Annex, Room 107

Signs directing you to the ORACLE terminal will be posted at each site during November, when the terminals are installed.

Users are encouraged to make full use of this facility, thus taking advantage of the considerable effort on the part of UTCS to provide quality advising service.

Paul Roth

HOTNEWS Bulletin Boards

In an attempt to respond to complaints that UTCS has not always notified its users in the most efficient manner regarding changes in its service, we shall be providing notice boards at most user sites and output areas. To the best of our staff's ability, we shall maintain current listings there of HOTNEWS on batch output. We encourage users to make a habit of verifying whether any of these notices impact services which they are using. The information posted in this way will be the same as that found in HOTNEWS on batch output.

Dr. Frank Spitzer

The Editor

Attentive readers of *COMPUTERNEWS* may have noticed the rapid change of Editorship over the past two issues. This is primarily due to the redeployment of staff to meet changing needs. Mr. David Reed, the Editor since September 1981, had skills required in other facets of UTCS service, and Ms. Harriet Cooper was asked, at short notice, to assume the responsibility until the position could be filled on a permanent basis. During this period, their contributions maintained the quality of *COMPUTERNEWS*.

Dr. William (Bill) Fehlner, the newly appointed Editor, assumes the role with a wide range of academic qualifications and considerable experience in user consulting. As one of the marketing representatives on campus (formerly a CSR) he has had wide

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The Editor continued

ranging interaction with users, particularly in the Faculties of Arts and Science. His previous activities included lecturing and providing a similar consulting and editorial role at York University. Readers who have suggestions or criticisms are invited to communicate with Dr. William Fehlner at 978-6509.

Dr. Frank Spitzer

The Marketing Group

The recent reorganization and certain budgetary considerations have resulted in several UTCS staff members changing both positions and locations.

Marketing Group

A new position of marketing representative has been established with the goal of making UTCS more responsive to the long term needs of users.

The Marketing group currently resides at McLennan Labs, 60 St. George, Room 217. Bill Fehlner (formerly of Sidney Smith) will focus on the needs of campus users while Ihor Prociuk (formerly of 49 St. George) will look after external clients. Supporting Bill and Ihor in a backup roll are Sally Holton and Helen Mariano (both of the former Contract Programming Group at 49 St. George). All members of the Marketing group have retained their old phone numbers.

In some respects, the new Marketing Group will do some of the things that the Computing Service Representatives (CSR) used to do. The Group will assist in setting up computer accounts and help users in choosing the most appropriate computer system or package to meet their needs. The Marketing Group has a broad base of experience in many computing aspects and can call upon the resources of other qualified personnel within UTCS for technical assistance. Users are encouraged to contact a member of the Marketing Group for assistance in introducing or extending the use of computers in their field of work.

Ihor Prociuk

Advising Consolidated

In September, the function of the Timesharing Advising Office became part of the Central Advising Office in McLennan Labs. The move was completed with virtually no disruption to our service, and we hope that our proximity to other UTCS Support Groups will allow us to provide better service.

If you are experiencing any difficulties, call the UTCS phone-in Advisors at 978-HELP for assistance. Interactive users can send electronic mail to 'advisor', submit Wylbur 'SUGGEST', or run DEC-10 'Gripe'.

If one of the advisors cannot solve your problem directly, they may draw upon the expertise of other UTCS staff members. This may require returning your call with a solution.

For a problem requiring a more in depth analysis, the Advisor can arrange an appointment with a senior consultant in the Advising Office, or with an appropriate UTCS Applications staff member.

The combined expertise of the two Advising Office Consultants, Terry Jones and William Barek, and the Advisors, allows us

continued...

Advising Consolidated continued

to continue to provide a complete troubleshooting service for members of the UTCS computing community.

Advisors are available for telephone consultation Monday through Friday between 10 a.m. and 6 p.m. Suggestions and comments are welcome. They can be directed to Alex Nishri at 978-HELP.

Scott Owen
Alex Nishri

GIGI Terminals

The University of Toronto has recently received the donation of several GIGI terminals and accessories from Digital Equipment of Canada. UTCS plans to install some of these graphics terminals in the research terminal facility, McLennan Labs, Room 221, where they should receive wide use by the academic/research community. In addition, we anticipate that these facilities will be used for teaching and will be of considerable benefit to the students and staff of the University.

Dr. Frank Spitzer

Computer Users Committee

As many users of the computing services facilities are aware, during the past months, Vice-President Nowlan formed a number of advisory committees in addition to the Board of Review for UTCS. As a result, the Computer Users Committee, at its September meeting, was concerned with its future role. In the discussion of this, Professor Nowlan indicated that he felt that the concerns of the user community would be protected by the advisory committees which he had formed. The Computer Users Committee felt otherwise and indicated strongly that, as representatives of users from the entire University community, it still had a role to play. This position was accepted, at least on an interim basis, by Professor Nowlan. The Committee, therefore, will continue its regular monthly meetings, generally on the first Monday of each month. Each Department should send its representative in order that the Committee will be able to provide input, both to UTCS and also to Professor Nowlan, concerning their use of computers.

Professor John Hurd, the Chairman of the committee for the past two years, has agreed to remain as Chairman pending the final resolution of the entire Committee structure for computing use on campus. Comments, suggestions, and criticisms may be forwarded either to him, care of Trinity College, or to the undersigned.

Dr. Frank Spitzer

Gould Plotter Output

A new method of selecting the paper type for Gould plotter output became available on October 1, 1982. The old method will be accepted until November 15, 1982. Users who have their own access procedures using either TS0 or JCL, will need to make changes by November 15.

The roll and fanfold papers for the Gould output are now identified by FORM NAMEs within one SYSOUT CLASS instead of being defined as two different SYSOUT CLASSes. This change makes the identification convention for Gould output conform to the new standard established when we introduced the Calcomp 1051 plotter. It also allows us to accommodate new paper types as the need arises. The correspondence between the old and new methods is shown in Table 1.

Gould paper	Old method	New method		
	SYSOUT CLASS	SYSOUT CLASS	FORM NAME	DESTINATION
fanfold	6	5	G160	GOULD
roll*	7	5	G170	GOULD

* roll paper will continue to be the default.

Table 1. Correspondence between the old and new methods.

The FORM NAME, mwpi, is comprised of single character codes for the machine-type (m), width-of-paper (w), paper-type (p) and ink-type (i). It has the same format as that for Calcomp. The codes assigned for Gould are indicated in Table 1. The only option for Gould is p=6 (fanfold) or p=7 (roll).

The new destination "GOULD" (similar to "CAL1051" for Calcomp) has been introduced to facilitate Operations response to user queries about queue status.

This changeover to a new method should require no program changes by users accessing Gould via UTCS supported catalogued procedures. These procedures have been updated appropriately.

Users who have their own access procedures using TSO or JCL will need to make the simple changes summarized in Table 2 below.

Access	Gould Paper	Old method	New Method
Batch	fanfold	SYSOUT=(6)	SYSOUT=(5,,G160),DEST=GOULD
	roll	SYSOUT=(7)	SYSOUT=(5,,G170),DEST=GOULD
TSO	fanfold	CLASS(6)	CLASS(5) FORMS(G160) DEST(GOULD)
	roll	CLASS(7)	CLASS(5) FORMS(G170) DEST(GOULD)

Table 2. For users with their own JCL or TSO access procedures.

If there is any question or problem, please contact the advisors at 978-HELP or Kin Fong at 978-4924.

Kin Fong

CSS Highlight: The Microcomputer Evaluation Facility

The Communications and Small Systems group has a major commitment to the expanding microcomputer field. In addition to supplying microcomputer systems to departments, we operate an evaluation facility for those planning the acquisition of a microcomputer. The facility has an Apple II Plus with disk drive and other accessories, an S-100 CP/M system, a Western Digital 'micro engine', a TRS-80 model I, a newly acquired IBM Personal Computer, a small PDP-11 running UNIX, a line printer, and various accessories. These are available to faculty and staff considering obtaining a microcomputer for departmental use. Anyone interested may contact Grant Davis at 978-5071.

CSS is planning a series of seminars on introductory topics concerning microcomputers. This series will be oriented toward researchers or graduate students who wish to buy 'micros' for use in their departments. Their emphasis will be on the capabilities and limitations of micros, and on selecting a microcomputer. The series is still at the planning stage; suggestions and ideas may be given to Grant Davis.

Ian F. Darwin

PACX Enhancements

In the September issue of *COMPUTER-NEWS* we introduced some of the highlights of the PACX upgrade to Revision D. This month we would like to present, in detail, the PACX enhancements of Revision D2 as they will exist here at UTCS. In addition to correcting a number of known problems, this upgrade will also consolidate some classes and provide a HELP facility for the PACX.

Classes

Consolidation of classes will result in classes 20, 21, 30, and 31 being merged into a single Class 30. Also, Classes 70 and 71 will be consolidated into Class 70.

Alphanumerics

Alphanumeric classes, which directly correspond to numeric classes, will soon be available. Alphanumeric designations will have up to six characters.

With the consolidation of classes and availability of alphanumeric designations, the class structure will be as follows:

Numeric Class	Service	Alphanumeric Class
10	DEC-10	DEC-10
12	DEC-10*	DEC10F
30	IBM "A"	IBMA
32	IBM "A"*	IBMAF
63	LIBRA VAX 11/780	LIBRA
70	UNIX 11/70	DEC70
-	-	HELP

*Note: 4800 baud

continued...

PACX Enhancements continued

SIGN-ON

At present, when signing on through the PACX, the user types two carriage returns. The first connects you to the PACX. The second alerts the host port once the connection is made through the PACX. With the Auto-Baud Character Passthrough enhancement, only one carriage return will be required. If, for example, two carriage returns are hit when signing on to the DEC-10, two periods will be sent back to the terminal instead of one.

Disconnect

As an additional security precaution for those signed on through the PACX, the Timed Port Disable feature will be implemented. This facility will automatically disable a disconnected port for a preset time of fifteen seconds before re-enabling the port. This ensures that the system has time to close all files from the session before another user is connected.

Maintenance

The PACX will continue to be unavailable between 06:00 and 08:00 Wednesday mornings. This is reserved preventative maintenance time and if users try to sign on they will receive a message that the PACX is unavailable. If users manage to get through to the required hosts at this time, they do so at their own risk.

Scanning

With the new version of PACX the maximum supported speed will be 4800 bps. At this speed, no ‘blocking’ of hosts will occur and users in queues will be connected as soon as possible after a port becomes available.

In the past, users had the option of using 9600 bps, but this has created a problem. To accommodate 9600 bps operation the PACX must use ‘double scanning.’ Under certain conditions this leads to terminals being blocked from accessing the requested port. At present, we are finding that blocking is a problem; therefore, double scanning is being eliminated. With single scanning at the maximum 4800 bps, there will be no blocking whatsoever.

HELP

An additional class called ‘HELP’ will become available to provide direction in receiving help for PACX. During sign-on, the class HELP may be requested and the terminal will respond with further information for accessing the PACX help files.

Users will be notified via online messages and HOTNEWS when these enhancements come into effect.

Ron Vander Kraats

Edition 9 of IMSL

IMSL, Inc. has announced the release of Edition 9 of the IMSL Library and it is presently being installed on the academic IBM system. This set of Fortran routines, designed to be used in the development of scientific and engineering applications programs, now contains 517 subroutines covering the general fields of mathematics and statistics. Forty new routines have been added in several different areas, some of which are described below.

Statistical Procedures

Two new routines for frequency tabulations have been added to Chapter B of the Library. One, BDTAB, tabulates counts for multivariate data, and the other BDTWT, forms two-way tables and computes the Pearson chi-squared statistic. There are

continued...

Edition 9 of IMSL continued

three new easy-to-use routines for producing histograms and a new routine for producing probability plots for normal, log normal, half-normal, exponential, Weibull and extreme value distributions. A new routine in Chapter C is provided for life table analysis. Friedman's test and nonparametric multiple comparisons in a randomized complete block design are performed by a new routine in Chapter N.

Eigensystem Analysis

A new subroutine has been added to solve the generalized eigenvalue problem $Ax = \lambda Bx$ when A and B are symmetric and B is positive definite. This solution arises frequently in differential equation calculations.

Random Number Generation

There are new routines for generation of variates from a von Mises distribution, for generation of a random correlation matrix, and for generation of a random contingency table with given row and column totals. This latter routine may be useful in the estimation of probabilities of various table configurations.

Special Functions

New routines for Weierstrass P-functions and their derivatives for both the lemniscatic and equianharmonic cases have been added to Chapter M. Several new routines in Chapter M compute Bessel functions and modified Bessel functions of the first and second kinds. Other new routines compute exponential integrals of general order and incomplete elliptic integrals of the first, second, or third kind. Another new Chapter M routine computes expected values of normal order statistics.

Zeroes and Extrema

A new routine for solving non-linear systems has been added to the Edition 9 Library. Another new subroutine finds a minimum of a single argument function. Both routines should work well both near and moderately far from the solution.

Another subroutine attempts to find the global minimum of a multivariate function in a hyperrectangle. This program uses ZSRCH to generate various initial values and implements a change of variables, which converts all possible global minima (including those on the boundary) into local minima. ZXMIN is then invoked to find and compare the local minima of the now unconstrained problem.

Edition 9 of the IMSL Library should be available to users shortly. Please watch HOTNEWS and further issues of *COMPUTERNEWS* for more information.

Diane Mitchell

SAS PROC TABULATE: New in SAS82

When available at UTCS, SAS82 will include a new procedure, TABULATE, for producing hierarchically organized tables of descriptive statistics. The tables clearly express the relationships among classification variables, analysis variables, and statistics. Several formatting features simplify the production of concise, readable tables.

Tables

A table may have up to three dimensions - page, row (or 'stub'), and column (or 'banner'). Each table cell contains a descriptive statistic calculated on all values of an analysis variable from observations sharing the same set of class variable values. The table dimensions are specified by expressions that contain class variables, analysis variables, statistic keywords, and format items connected by two operations, nesting and concatenation. These two operations express the relationships of the class variables and the positions and for-

continued...

PROC TABULATE continued

matting of the calculated results in the table. One-, two-, and three-dimensional expressions, separated by commas, may be specified in the TABLES statement.

Variables and Statistics

TABULATE operates on two types of variables: class variables (specified in the CLASS statement) and analysis variables (specified in the VAR statement). Class variables typically contain a few discrete values; these are used to classify each observation according to the hierarchy defined in the TABLE statement. The value of each analysis variable for the observation is used to compute the desired descriptive statistics. You can request a wide variety of statistics, including the number of observations in the subgroup, mean, minimum, variance, and many more.

Operators

Two operators are used to express the desired relationships between variables. A hierarchical relationship is described using the nesting operator '*'. For the class variables A and B (B nested within A), all levels of B are grouped within each level of A to form interactions. For example, A*B produces the hierarchy below.

A=1			A=2	
B=1	B=2	B=3	B=1	B=3

The second operator, represented by a blank, is the concatenation or 'follow' operator. Concatenating variables B and C requests that the values for C follow the values for B. For example, the expression A*(B C) produces:

A=1					A=2			
B=1	B=2	B=3	C=1	C=2	B=1	B=3	C=1	C=2

The ALL class variable

A special class variable, ALL, represents the universal class. The universal class variable may be considered to have the same value for any observation so that when ALL is nested with other class variables, the subset of observations defined is the subset described by the other variables in the nesting that are before the ALL. For example, the expression A*(B ALL) gives:

A=1				A=2		
B=1	B=2	B=3	ALL (A=1)	B=1	B=3	ALL (A=2)

Formatting and Titling

The TABULATE procedure offers several facilities for formatting data values and supplying titles. The FORMAT procedure may be used to format the class variable values or the variables may be character valued. Any label text specified for a variable in the LABEL statement will be used for that variable. Any statistic names, including the class variable ALL used in the TABLE statement, can be renamed using the KEYLABEL statement. The syntax of the KEYLABEL statement is the same as the LABEL statement syntax.

Use the FORMAT= (or F=) option in the TABLE statement to control the formatting of the table cells. The format specification is of the form w.d, where w is the field width and d is the number of places to the right of the decimal. In addition, cells with a value of zero can be printed using special text specified in the ZERO option.

Examples

The statements in Figure 1 create a SAS data set containing product sales in certain geographic areas. The TABULATE procedure summarizes the data using three table dimensions. The page expression specifies that a page will be produced for each product code. The row expression specifies a hierarchy of class variables, CITYSIZE within REGION. In addition, totals are requested by region (REGION*ALL) and by product. The column expression specifies a further breakdown by SALETYPE, and the two

continued...

PROC TABULATE continued

analysis variables and statistic to be calculated. F= is used to format each column. The resulting output is shown in Figure 2.

Examples of PROC TABULATE, as well as complete documentation, can be found in "SAS User's Guide: Basics". Please watch HOTNEWS, SAS News, and *COMPUTERNEWS* for information on when SAS82 and PROC TABULATE will be available.

Diane Mitchell

```
DATA;
   INPUT RECION $ CITYSIZE $ PRODUCT $ SALETYPE $
         QUANTITY AMOUNT;
   CARDS;
   NC S A100 R 1501    37534.58
   NE S A100 R 2000    50078.76
   SO S A100 R 4100   102500.50 ·
   WE S A100 R 1873    45000.00
   NC M A100 R 3526    87545.36
   .
   .
   .
   WE L A300 W 8800   176000.00
;

PROC FORMAT;
   VALUE $REGFMT NC='NORTH CENTRAL'
                 NE=NORTHEAST
                 SO=SOUTH
                 WE=WEST;
   VALUE $SIZEFMT S='UNDER 50000'
                  M='50000 TO 500000'
                  L='OVER 500000';
   VALUE $SALEFMT R=RETAIL
                  W=WHOLESALE;

PROC TABULATE;
   CLASS PRODUCT REGION CITYSIZE SALETYPE;
   VAR   QUANTITY AMOUNT;
   FORMAT RECION $RECFMT.;
   FORMAT CITYSIZE $SIZEFMT.;
   FORMAT SALETYPE $SALEFMT.;
   LABEL PRODUCT='PRODUCT CODE'
         RECION='RECION OF COUNTRY'
         CITYSIZE='CITY SIZE'
         SALETYPE='TYPE OF SALE'
         AMOUNT='$ AMOUNT';

   TABLE PRODUCT,
         RECION*(CITYSIZE ALL) ALL,
         SALETYPE*(QUANTITY*F=8 AMOUNT*F=9.2)*SUM;
   KEYLABEL SUM='OF SALES'
            ALL=TOTAL;
```

Figure 1: PROC TABULATE Source

```
    S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

PROOUCT CODE A100

+------------------------+-----------------------------------+
|                        |           TYPE OF SALE            |
|                        |-----------------------------------|
|                        |     RETAIL      |    WHOLESALE    |
|                        |-----------------+-----------------|
|                        |QUANTITY|$ AMOUNT|QUANTITY|$ AMOUNT|
|                        |--------+--------+--------+--------|
|                        |OF SALES|OF SALES|OF SALES|OF SALES|
|-----------+------------+--------+--------+--------+--------|
|REGION OF  |CITY SIZE   |        |        |        |        |
|COUNTRY    |            |        |        |        |        |
|-----------+------------|        |        |        |        |
|NORTH      |OVER 500000 |    7525| 1802.34|    7500| 1520.30|
|CENTRAL    |------------+--------+--------+--------+--------|
|           |50000 TO    |        |        |        |        |
|           |500000      |    3526|  845.36|    3579|  778.90|
|           |------------+--------+--------+--------+--------|
|           |UNOER 50000 |    1501|  334.58|       .|       .|
|-----------+------------+--------+--------+--------+--------|
|NORTHEAST  |OVER 500000 |    8000| 2070.80|    8042| 1608.00|
|           |------------+--------+--------+--------+--------|
|           |50000 TO    |        |        |        |        |
|           |500000      |    6000| 1500.00|    6000| 1286.94|
|           |------------+--------+--------+--------+--------|
|           |UNOER 50000 |    2000|  578.76|    2000|  407.29|
|-----------+------------+--------+--------+--------+--------|
|SOUTH      |OVER 500000 |    7613| 1956.07|    7600| 1500.70|
|           |------------+--------+--------+--------+--------|
|           |50000 TO    |        |        |        |        |
|           |500000      |    7156| 1707.12|    7100| 1450.00|
|           |------------+--------+--------+--------+--------|
|           |UNOER 50000 |    4100| 1000.50|    4117|  800.89|
|-----------+------------+--------+--------+--------+--------|
|WEST       |OVER 500000 |    8800| 2256.47|    8823| 1760.02|
|           |------------+--------+--------+--------+--------|
|           |50000 TO    |        |        |        |        |
|           |500000      |    7800| 1900.00|    7881| 1500.67|
|           |------------+--------+--------+--------+--------|
|           |UNOER 50000 |    1873|  400.00|    1800|  387.50|
|-----------+------------+--------+--------+--------+--------|
|REGION OF  |            |        |        |        |        |
|COUNTRY    |            |        |        |        |        |
|-----------+------------|        |        |        |        |
|NORTH      |            |        |        |        |        |
|CENTRAL    |TOTAL       |   12552| 2982.28|   11079| 2299.20|
|-----------+------------+--------+--------+--------+--------|
|NORTHEAST  |TOTAL       |   16000| 4149.56|   16042| 3302.23|
|-----------+------------+--------+--------+--------+--------|
|SOUTH      |TOTAL       |   18869| 4663.69|   18817| 3751.59|
|-----------+------------+--------+--------+--------+--------|
|WEST       |TOTAL       |   18473| 4556.47|   18504| 3648.19|
|------------------------+--------+--------+--------+--------|
|TOTAL                   |   65894|16352.00|   64442|13001.21|
+------------------------+--------+--------+--------+--------+
```

Figure 2: PROC TABULATE Output

APL at UTCS

APL is a concise and powerful programming language which is particularly useful in applications involving the manipulation of large arrays. It differs from most other programming languages in several important ways:

- APL is an interactive language designed for the building, testing, modification, and use of programs. It also accepts expressions entered at the terminal for immediate execution.
- APL has an unusually large variety of primitive functions and operators, each of which is represented by its own symbol. To make this possible, APL has a unique character set with 141 distinct characters.
- The greatest power of APL lies in the variety of primitive functions it provides for manipulating arrays. In APL, primitive functions may accept entire arrays as arguments, and may produce entire arrays as results. Matrix inversion, rotation, and transposition are all primitive APL functions.

The version of APL offered by UTCS is obtained from I.P. Sharp Associates Limited, and is referred to as SHARP APL. Workspaces which use the SHARP APL extensions will not execute on a standard IBM APL\360 system without modification to the workspace functions to eliminate or simulate the extensions used from SHARP APL.

The material listed below, except where noted, may be obtained from, or ordered through:

UTCS Information Office
Engineering Annex, Room 206
Phone:978-4990

UTCS Publications available include:

1. The APL module of USERBOOK. This is currently being rewritten.
2. APL Applications Library Abstracts. These are available on line using the workspace 1 CATALOG.

I.P. SHARP Publications which are available from the Information Office include:

1. SHARP APL Reference Card
   Pocket/purse reference card listing APL functions and commands. This is HIGHLY RECOMMENDED to anyone using the APL system.
2. SHARP APL Reference Manual, by Paul Berry
   This manual is excellent for REFERENCE; however, a new user is urged to find an introductory text with which to begin his or her study. ("APL: An Interactive Approach" by Gilman and Rose is recommended.)

Other I.P. SHARP publications may be ordered through the Information Office, including:

1. SHARP APL minicourse -- An introduction to SHARP APL
2. SHARP APL Report Formatting -- Describes the use of the Quad FMT facility for producing tabular output.
3. SATN'S - SHARP APL Technical Notes
4. SHARP APL Functions for Statistical Analysis

Recommended texts, which may be ordered through any bookstore:

1. "APL An Interactive Approach", second edition by Leonard Gilman and Allen J. Rose (John Wiley & Sons, Inc.)
   This is a standard text, and is highly recommended if you are learning APL. However, it is based largely on APL\360, and does not include the extensions to APL which exist in SHARP APL. This text is usually

continued...

APL at UTCS continued

stocked by the U of T Textbook Store.
2. "APL Users Guide", by Harry Katzan, Jr. (Van Nostrand Reinhold Company)
3. "APL\360 Reference Manual", by Sandra Pakin (Science Research Associates, Inc.)

Periodicals

I.P. SHARP Newsletter is published monthly by I.P. Sharp Associates Limited. It includes articles on recent developments in SHARP APL, as well as interesting algorithms and technical points regarding the use of APL. Requests for this publication may be sent to:

I.P. Sharp Associates
Box 418, Exchange Tower
2 First Canadian Place
Toronto, Ontario
M5X 1E3

The "APL Quote Quad" is an "informal quarterly publication containing articles, algorithms, announcements, short notes, problems, book reviews, signed opinion and other material of interest to APL users."

Subscription inquiries may be sent to:

Fred Aronson
Co-ordinator of SIGS
Association for Computing Machinery
11 West 42nd Street
New York, New York
USA 10036

Copies of "APL Quote Quad" are kept for reference purposes in the Computer Library.

M.A. Lawry

CSS News

The Communications group has now moved into its new quarters in the Sandford Fleming Building. This marks the completion of an historical cycle for CSS, since our origins as a group go back to the early 1970's when the group was located in the Sandford Fleming Laboratories. At that time the independent group was part of the Computer Systems Research Group and was called the 'Computer Research Facility'. Later, it merged with UTCS, and was renamed Communications and Small Systems.

During the reconstruction of the Sandford Fleming building after the 1977 fire, CSS was relocated several times within parts of the building that had escaped the fire. In 1981, we moved into the old Metro Library building. Finally, in September, 1982, we joined the exodus of engineers and computer oriented groups moving back into the newly reopened Sandford Fleming Building. We are located on the fourth floor, east side, between space occupied by the Departments of Computer Science and Electrical Engineering.

The Communications group offers consultation on all aspects of computer communication and supports the PACX terminal switching unit. One way in which our users can realize cost savings and efficiency gains is through the use of 'private data channels' for connecting terminals or small computers through the PACX into UTCS mainframe computers. Many people use acoustically-coupled modems for this purpose; private data channels are faster, usually more reliable, and can be more cost effective in many situations. To find out if you could benefit through the use of a private data channel, please contact Ron Vander Kraats at 978-4624.

In the Software group, one of our ongoing software development projects has been the development of a portable "full-screen editor". This is an editing program which will take full advantage of its communication with the user via a video screen (CRT terminal) rather than a hard copy terminal.

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CSS News continued

Patterned after the EDT editor of VAX/VMS and LIBRA (also known as the KED editor of RT-11 and VIVA), our editor is called "PED" and runs on UNIX-based computer systems. It is available on the PDP 11/70 and can be installed on departmental UNIX machines. An RT-11 version of PED is also available. If you would like to move from line editing to full-screen editing, and want to help us evaluate PED, please contact Mario Ruggiero at 978-4597.

The Hardware Services group of CSS configures small computer systems, usually based on small PDP-11's, using new and, when available, used components. We also offer a packaged micro-based Job Entry system as either a remote line printer or a card-reader/line printer. We can also make customized "black box" circuits to interface, time, count, or control your equipment. Contact Luke Sulatycki at 978-4693 for information.

The above are a few of our groups's diverse activities in the small computer facility. How can we help you with your small computer facility? Call us and find out! Contact any of our supervisors: Ian Darwin (978-6134) for software issues, Luke Sulatycki (978-4693) for hardware concerns, Ron Vander Kraats (978-4624) with communications questions, or Kam Mark (978-5050) for field service.

Ian F. Darwin

DECsystem-10 Users' Forum

The DEC-10 Users' Forum held Wednesday, September 29, was relaxed and informal. The attendance was not large, but the short presentations and informal discussions which have become characteristic of these gatherings seemed to be well received by those present. There were frequent opportunities to ask questions and express opinions directly to the UTCS personnel involved in various aspects of supporting the DEC-10.

The forum's informality was emphasized when Edmund West opened the meeting by removing his shirt to reveal a blue T-shirt with the white inscription

I don't care what people say
36-bits are here to stay

The motto was especially meaningful, of course, in light of the recent DEC-10 memory and disk upgrades. ("36-bits" is a reference to the size of a DEC-10 word.)

The subject generating the most interest was the recently announced change in hours of operator coverage. Users expressed concern about not having operator coverage at times when they hoped to be able to request tape mounts. David Ming-Sun discussed this and other issues related to operations. The users were particularly pleased when he announced that revised operator-attended hours for weekdays (0730 to 2330) were already in effect.

Frank Spitzer expressed the view of UTCS management on a number of topics such as printing charges and forms mounts. The recently modified role to be played by the UTCS Advising Office was discussed by Alex Nishri. Because the locations and open hours of public terminal areas are always subjects of interest to users, Terry Jones summarized the present status of this topic. John Bradley made a short presentation on text processing in general and the use of the Xerox 9700 printer in particular.

Other topics mentioned during these wide-ranging discussions were DEC-10 performance, DATAPAC, UTCS short courses, PACX, and accounting.

Dr. Edmund West

Computing News in Brief

Humans 9, Computers 5

Another round of the Fredkin Prize competition is complete and the 'Humans' have won. Computer chess programs from four American institutions failed to beat a human world chess master at the National Conference on Artificial Intelligence in mid-August, and the $100,000 prize money went unclaimed.

The competition, held at Carnegie-Mellon University in the States, featured chess programs from Bell Laboratories, the University of Southern Mississippi, Northwestern University, and Duke University.

Edward Fredkin of MIT established the contest in 1980 and, to date, no computer chess program has been able to beat the human grand master. David Lewin, Director of Science and Technology at Carnegie-Mellon, sees this trend continuing for at least ten years. For computer programmers however, there is always next year. Material for this article has been adapted from *Computerworld,* August 23, 1982.

Universiade '83: Digital's Keeping Score

The World University Games, Universiade '83, will be held in Edmonton, Alberta from July 1 to 11, 1983, and Digital Equipment of Canada will be there supplying a Computerized Results Network to aid in collecting scores, calculating medal standings, and generating sports statistics. Approximately 4500 athletes from 90 countries will be participating in the games.

Digital will be keeping score at the games with the help of 90 video terminals and printers linked to a VAX 11/780. A second system will be kept on standby "in case of equipment failure". If all goes as planned, information from the games will be "immediately available to the media, sports organizations, officials, athletes and coaches, and the public," says Digital.

Information in this article has been adapted from *Digital News,* Volume 4, Number 4.

Columbia and Princeton: Making Beautiful Music Together

Columbia University has installed a new "music synthesis language" as an extension of its Electronic Music Center. MIX, written by Paul Lansky of Princeton University, is more flexible than traditional music programming languages because it allows the user to create a number of separate tracks of music rather than single combined notes. The musical tracks, or layers as Columbia calls them, are first stored on a Mass Storage System (MSS) disk. Then, when the composer is ready to hear the composition, the layers are "mixed" together and written to a digital tape. A recording is made after the tape has been converted to an audio signal using a Digital-to-Analog Converter. The full complement can then be enjoyed using the playback facilities in the Electronic Music Studio next to the Music Center.

More information about MIX and the Electronic Music Center at CUCCA can be found in the September 8, 1982 issue of the CUCCA Newsletter available in the Information Office, EA 206.

Baruch College: Computing for the Visually Impaired

The City University of New York, CUNY, has a noteworthy extension to its Computer Center. It's called the Baruch College Computer Center for the Visually Impaired, and its goal is "to make computer assisted technologies available for use by the blind and visually impaired". At present, the center's talking terminals, refreshable braille displays, large print hard copy, braille computer terminals, and television screen magnifiers make available interactive and batch use of the CUNY University Computer

continued...

Computing News in Brief continued

Center (CUNY/UCC) facilities.

The Center for the Visually Impaired offers many specialized courses including a Corporate Training Program for job training. On-going research incorporates the Center's "improved computer production of tactual graphics" in maps and building floor plans. Information about careers will be available via synthetic speech, braille, and large print terminals when the "Career Path Informations Systems" project, now underway, is complete.

Material for the article has been adapted from *CUNY/University Computer Center Communications,* Volume 8, Number 5-8, Summer 1982.

Even the Boy Scouts Have Got 'Debug'

Since 1968 the Boy Scouts of America have been awarding merit badges for studies of computers. In line with the increasing popularity of microcomputers, the number of 'computer merit badges' being awarded has almost doubled between 1980 and 1981, and is expected to keep increasing. A Boy Scout doesn't have to actually work on a computer in order to complete the badge requirements. A knowledge of computing history, flowcharting, program storage, computer terminology, and a visit to a computer installation is sufficient. Even the Boy Scouts have problems with being out of date, though. Their computer merit badge features "a split image with a computer card on one side and a roll of computer tape on the other."

Material for this article has been adapted from *Popular Computing,* Volume 1, Number 12, October 1982.

Imitating Itamae-san

The fast-food phenomenon has been given a Japanese twist. The Genroku fast-sushi chain has begun employing robot sushi-makers, or "metallic itamae-san", which can make 1200 sushi cakes an hour. It seems that the human Japanese sushi-makers were just not fast enough for this fast-sushi chain. (Most average about 48 cakes an hour.)

Suzumo Machinery Industry Company is marketing the robots and the reaction from traditional sushi shop owners has been understandably cool. Said one shop owner: "Because of robots, we'll have two types of sushi shops. One will be the automated, take-home stuff which is not real, just a snack. And we will still have shops devoted to true sushi flavor."

From *Popular Computing,* Volume 1, Number 12, October 1982.

Patricia L. Shore

UTCS Change Committee

Full details on current changes will be published in *COMPUTERNEWS* and HOTNEWS as events occur. If there are any changes users feel would be of benefit, they should feel free to contact Dr. Spitzer at 978-4619.

1. SPEAKEASY was discontinued on September 1 as planned.
2. SAS 79.6 became the default version on the Administrative machine on October 15 in keeping with the version on the Academic machine.
3. Users of the DEC-1090, PDP 11/70, and VAX 11/780 should note that there will be operators on two shifts only and one unattended shift on weekdays due to shortage of staff. Attended shifts are from 0730 to 2330. During unattended shifts there will be no DEC-1090 tape mounts and no CAT output.
4. UTCS is planning to make release 4.0.0 for PL/I the default on the Ad-

continued...

UTCS Change Committee continued

ministrative system.
5. IPRINT on the DEC-1090 was upgraded to provide control-X characters below "40" and to provide overstriking. The new IPRINT is in SYS:.
6. UTCS is investigating providing CALCOMP support for the DEC-1090.
7. New SYSOUT classes for the GOULD are now available. See "Gould Plotter Output" in this issue for details.
8. UTCS will be charging for special forms. Charging will not be billable to CANs. A letter to users concerning this has been sent out.
9. Class C memory usage rate reverted back to regular Academic year rate on October 1.
10. UTCS plans to upgrade Series/1 software in the near future.

Cecilia Welch

User Exchange

*** SALE * SALE * SALE ***

UTCS is selling used computer hardware at bargain prices! There are incredible savings on CRTs, printing terminals, cabinets, modems, computers and much more.

The equipment is sold as is and must be picked up where it is. Purchase is by appropriation account number only. No reasonable offer will be refused.

For additional information please call:

Arny Sokoloff - 978-4549.

The sale ends on November 12, 1982 so get them while they last!

Arny Sokoloff

Erratum

The article entitled "Communications and Small Systems", in the September issue of *COMPUTERNEWS*, contains an error. The phone number for Grant Davis should be 978-5071 instead of 978-4071. Please note this for further reference.

Kathryn Bourne

Summary of APL Hotnews Items

The following is a list of HOTNEWS items entered between August 6, 1982 and October 10, 1982.

DATE	TITLE
29/07/82	Hours of service for the Civic Holiday weekend.
05/08/82	Newer functions which are equivalent to the old I-beam functions.
05/08/82	Differences between QuadAIai at UTCS and on the IPSA APL system.
06/08/82	Workspace 4 DOCWS has been fixed, again.

continued...

APL Hotnews continued

06/08/82	Courses offered by Keysoft International Limited.
25/08/82	More seminars offered by Keysoft International Limited.
13/09/82	The phone-in advising number is now 978-HELP.
20/09/82	The CIPS APL SIG is meeting on Wednesday, September 22/82.
21/09/82	APL courses offered by I.P. Sharp Associates.

APL HOTNEWS may be accessed by loading the workspace, 1 HOTNEWS. For example, to print the news of November 28, 1981, type: NEWS '28/11/81'. To print all news items since October 1, 1981, type: NEWS SINCE '01/10/81'. For more instructions on the use of this workspace, please see the variable DESCRIBE.

Mary Ann Lawry

Personnel Changes

There have been several promotions this month. **Grant Davis** has replaced Mike Grossman in the Microcomputer division of CSS. In Operations, **Sam Harrichand** has moved from Operator 2 to Operator 3.

Mohamed Tarikh an Operator 1 in Operations, joined UTCS on September 1. Joining the CSS group in the position of Communications Coordinator is **Tom Currie.** Tom has just completed his M. Eng. with the Communications Group in Electrical Engineering. **Kimberly Kippen,** who worked in Publications, has returned to Waterloo to continue her studies. **Pat Shore** has returned to UTCS for another work term. She has replaced Kim and will work until the end of December. **Clara Pereira** has returned after her maternity leave and has resumed her previous duties in the Management Office.

Kathryn Bourne

Recent Acquisitions In The Computer Library

Ballard, Dana H. and Brown, C.M.
Computer vision.
Englewood Cliffs, N.J., Prentice-Hall, 1982.

Bigelow, Robert P., ed.
Computers & the law: an introductory handbook. 3rd ed.
Chicago, Commerce Clearing House, 1981.

Boyer, Robert S. and Moore, J.S., eds.
The correctness problem in computer science.
London, Academic Press, 1981.

Calingaert, Peter.
Assemblers, compilers and program translation.
Potomac, Md., Computer Science Press, 1979.

Conference on Human Factors in Computer Systems, Gaithersburg, Md., March 1982.
Human factors in computer systems.
Washington, D.C., ACM, 1982.

Fernandez, E.B., Summers, R.C., and Wood, C.
Database security and integrity.
Englewood Cliffs, N.J., Prentice-Hall, 1981.

Fletcher, William I.
An engineering approach to digital design.
Englewood Cliffs, N.J., Prentice-Hall, 1980.

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New Titles continued

Franta, W.R. and Chlamtac, I.
Local networks: motivation, technology and performance.
Lexington, Mass., D.C. Heath, 1981.

Hume, J.N.P. and Holt, R.C.
Structured programming using PL/I, 2d ed.
Reston, Va., Reston Pub. Co., 1982.

Iliffe, J.K.
Advanced computer design.
London, Prentice-Hall International, 1982.

Kogge, Peter M.
The architecture of pipelined computers.
Washington, D.C., Hemisphere Pub. Co., 1981.

Kudlick, Michael D.
Assembly language programming for the IBM systems 360 and 370.
Dubuque, Iowa, Wm. C. Brown, 1980.

Richardson, G.P. and Pugh, A.L., III.
Introduction to system dynamics modeling with DYNAMO.
Cambridge, Mass., MIT Press, 1981.

Shaw, Mary, ed.
Alphard: form and content.
New York, Springer-Verlag, 1981.

Sippl, Charles J.
Microcomputer dictionary. 2d ed.
Indianapolis, Howard W. Sams, 1981.

Sobel, Robert.
I.B.M., colossus in transition.
New York, Times Books, 1981.

World Conference on Medical Informatics, 2d, Toronto, Aug. 1977.
MEDINFO 77, ed. by D.B. Shires ad H. Wolf.
Amsterdam, North-Holland, 1977.

Yourdon, Edward N., ed.
Classics in software engineering.
New York, Yourdon Press, 1979.

Stephanie Johnston

Consulting and Enquiries

Internal Users Marketing	Dr. Bill Fehlner	MP217	6509
External Users Marketing	Ihor Prociuk	MP217	6875
Erindale College	Peter Wall	2043	828-5311
Scarborough College	Bob Blackburn	S628-A	284-3173

General Enquiries	4990	System Status Enquiries (DEC)	4318
Programming Advising	HELP	System Status Enquiries (IBM)	7393
Access Codes	8703	300 Baud Interactive Services	6200
Account Enquiries (U of T)	8702	1200 Baud Interactive Services	3959
Account Enquiries (External)	7148	DATAPAC	4320 0056
Tape Library (Academic Services)	7319	Telenet	20477
Tape Library (Administrative Services)	6693	Tymnet	<backspace> 30200;;4320 0056
U of T Computer Library	2987		

UTCS Directory

Director	Dr. Doron Cohen	MP350	8948
Associate Director	Allan Heyworth	MP350	4936
Associate Director	Eugene Siciunas	MP350	5058
Assistant Director	William Murphy	MP345	4428
Executive Asst., Research & Planning	Wendy Chin	MP350	5568
Managers			
Applications Support & Advising	Don Gibson	MP350	7331
Communications & Field Service	Norman Housley	MP350	4967
Consulting & Information Services/ Faculty Liaison	Dr. Frank Spitzer	MP350	4619
Facilities Management	Terry Wood	MP350	7130
Operations	Dr. Bob Chambers	MP350	7092
Systems	Bill Lauriston	MP350	3579
User Accounting Services	William Murphy	MP345	4428

UTCS Systems

3033/N12 Processor

- located in McLennan Physical Laboratories
- provides General Purpose Job Stream, High Speed Job Stream, TSO, WYLBUR, APL and ATMS services
- 12 megabytes of memory
- MVS with JES2

3033/U16 Processor (BICS)

- located in McLennan Physical Laboratories
- provides "Glass Keypunch" access to HSJS
- 16 megabytes of memory
- UTS under VM

4341 Mod II Processor

- located in McLennan Physical Laboratories
- provides administrative IMS/VS, DB/DC, Batch and TSO
- 8 megabytes of memory
- MVS with JES2

DECsystem-10 Model 1090

- located in McLennan Physical Laboratories
- provides General Purpose Time-Sharing
- 512 K - 36 bit words of memory
- TOPS-10 operating system, version 7.01

Communications & Small Systems (CSS)

- located in Sandford Fleming Building, Fourth Floor
- DEC PDP-11/40 with GT44 Graphics
- DEC PDP-11/05 with GT40 Graphics
- Various Z80-based microcomputers (S-100, CP/M)
- IBM Personal Computer
- Western Digital Pascal MicroEngine
- Apple II Plus
- Radio Shack TRS-80
- provides specialized interactive graphics
- provides online and real-time computing services, data acquisition and conversion, and minicomputer services
- provides communications consulting and installation
- maintains computer systems
- provides consulting and configuration of microcomputer systems

PDP 11/70 (DPS)

- located in McLennan Physical Laboratories
- provides UNIX text processing
- 640K of memory
- UNIX (Western Electric)

VAX 11/750 (CDF)

- located in Engineering Annex
- provides Computer Science interactive access
- 2 megabytes of memory
- UNIX (Berkeley)

VAX 11/780 (CDF)

- located in Engineering Annex
- provides Computer Science interactive access
- 4 megabytes of memory
- UNIX (Berkeley)

VAX 11/780 (LIBRA)

- located in McLennan Physical Laboratories
- provides backup, program testing, and inter-communication relating to student services
- provides Spare Cycle Service
- 4 megabytes of memory
- VMS, LIBRA

VAX 11/750 (LIBRA)

- located at Scarborough College
- provides "Glass Keypunch" access to HSJS
- 2 megabytes of memory
- LIBRA under VMS

VAX 11/780

- located at Erindale College
- provides "Glass Keypunch" access to HSJS and Research access
- 4 megabytes of memory
- VMS, LIBRA

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